Seabirds and Artificial Nocturnal Light

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“Our diurnal bias has allowed us to ignore the obvious, that the world is different at night and that natural patterns of darkness are as important as the light of day to the functioning of ecosystems.”

Ecological Consequences of Artificial Night Lighting

Catherine Rich & Travis Longcore (2006)

Objectives

→ Bird attraction to light

→ Species vulnerabilities

→ Weather conditions and seasonal shifts

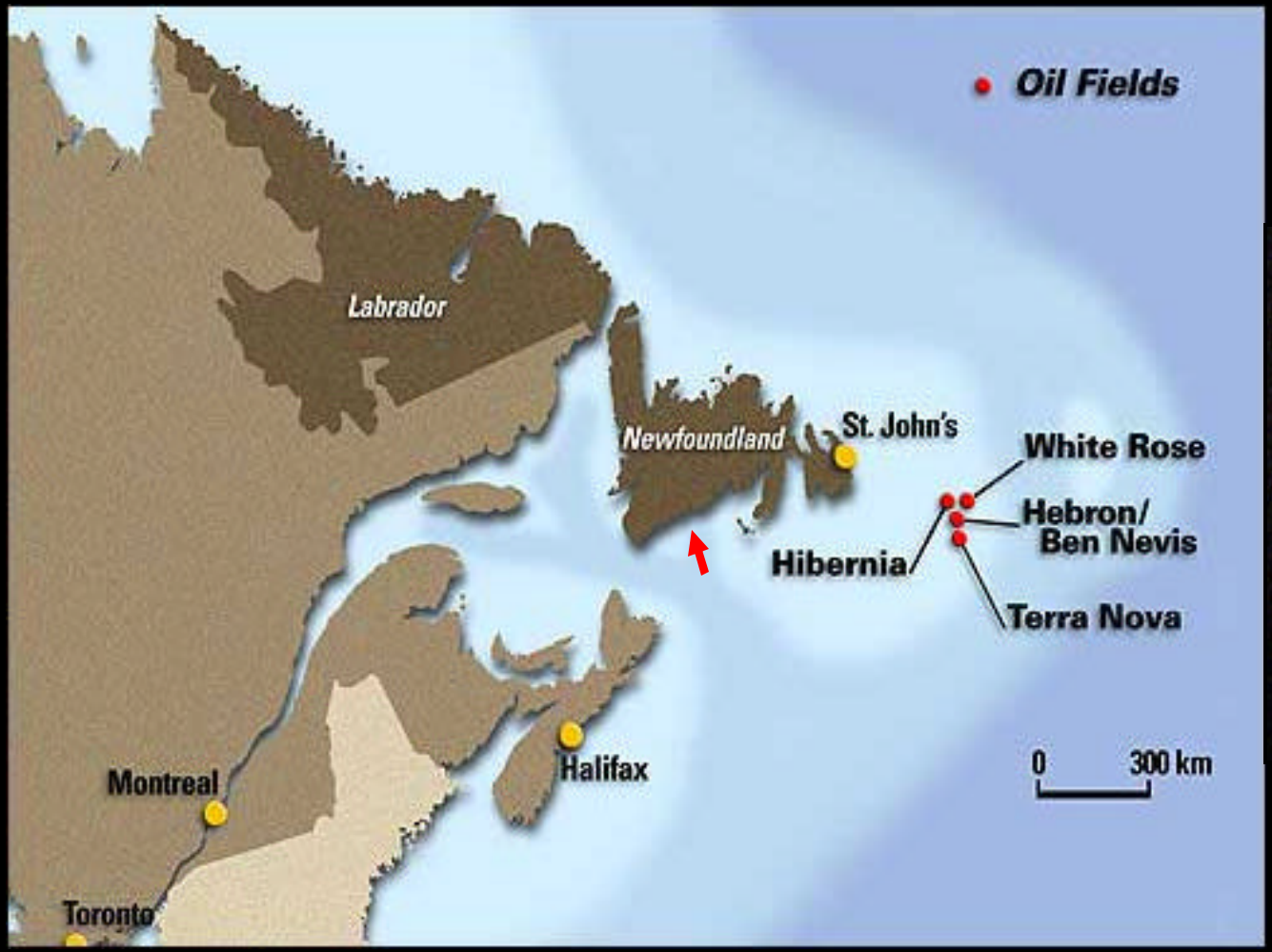
→ Cumulative effects associated with light attraction

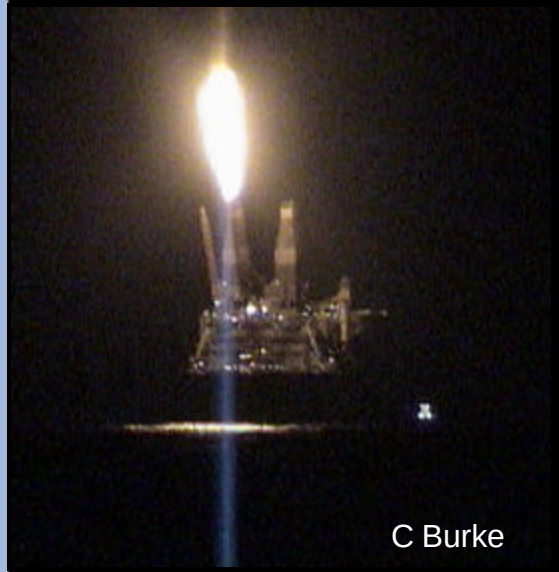
→ New research

→ Research designs to capture episodic events

→ Risk-assessments and mitigative actions

Platform Flares and Lights





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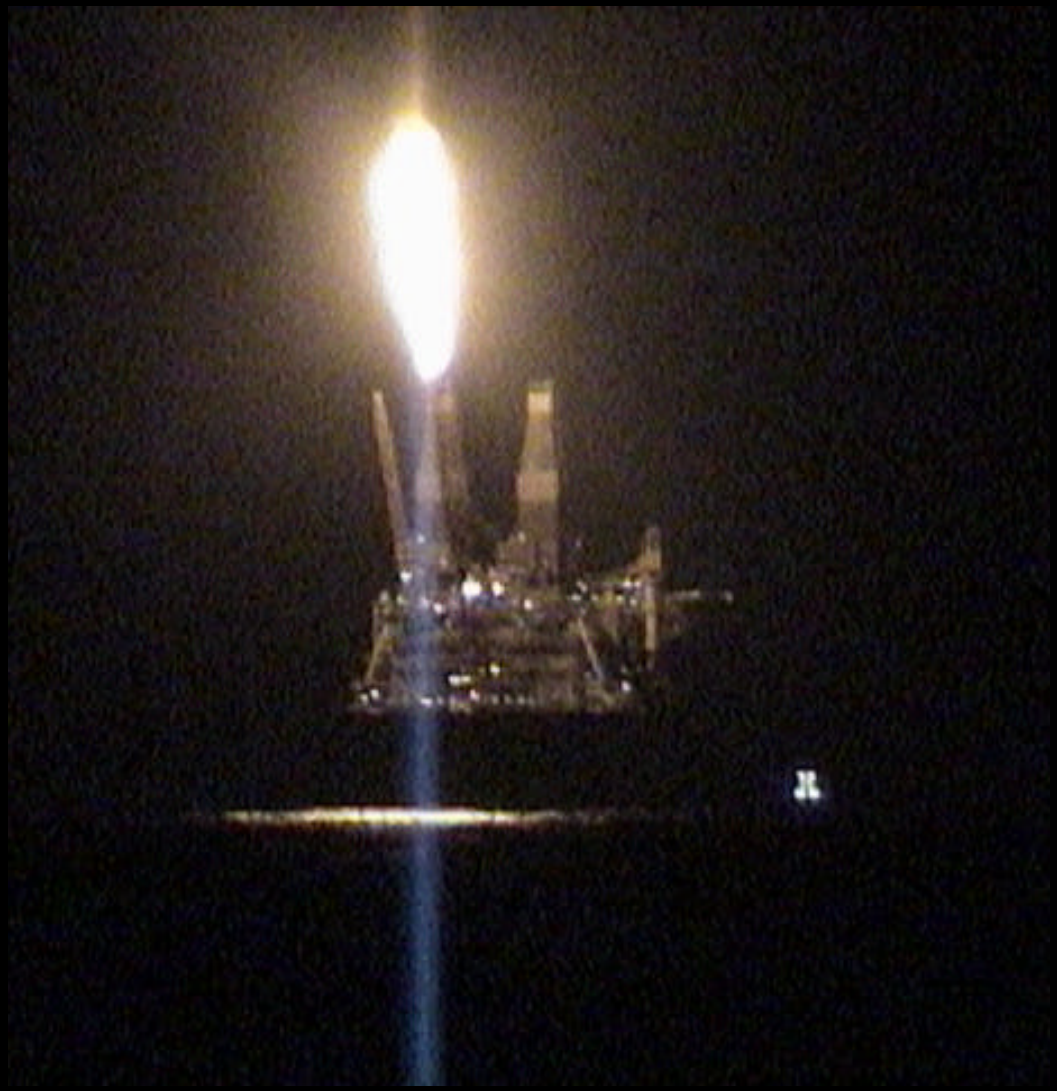
Platform Flares and Lights



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Bird attraction to [capture by] light

- **Nocturnally active species**
  - planktivorous seabirds (bio-luminescent prey)

- **Nocturnal migrants**
  - seabirds and passerines (sky and horizon light)

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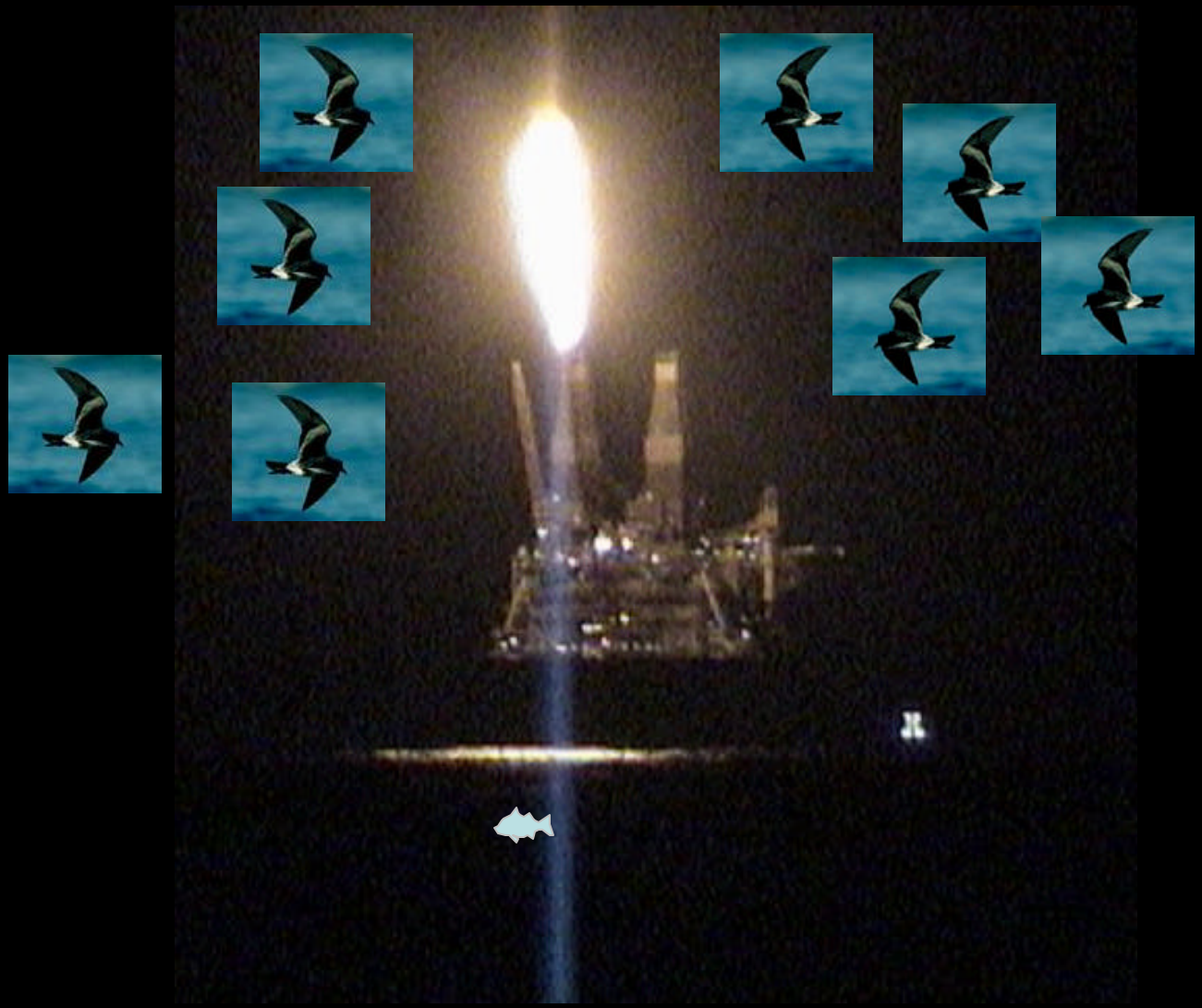
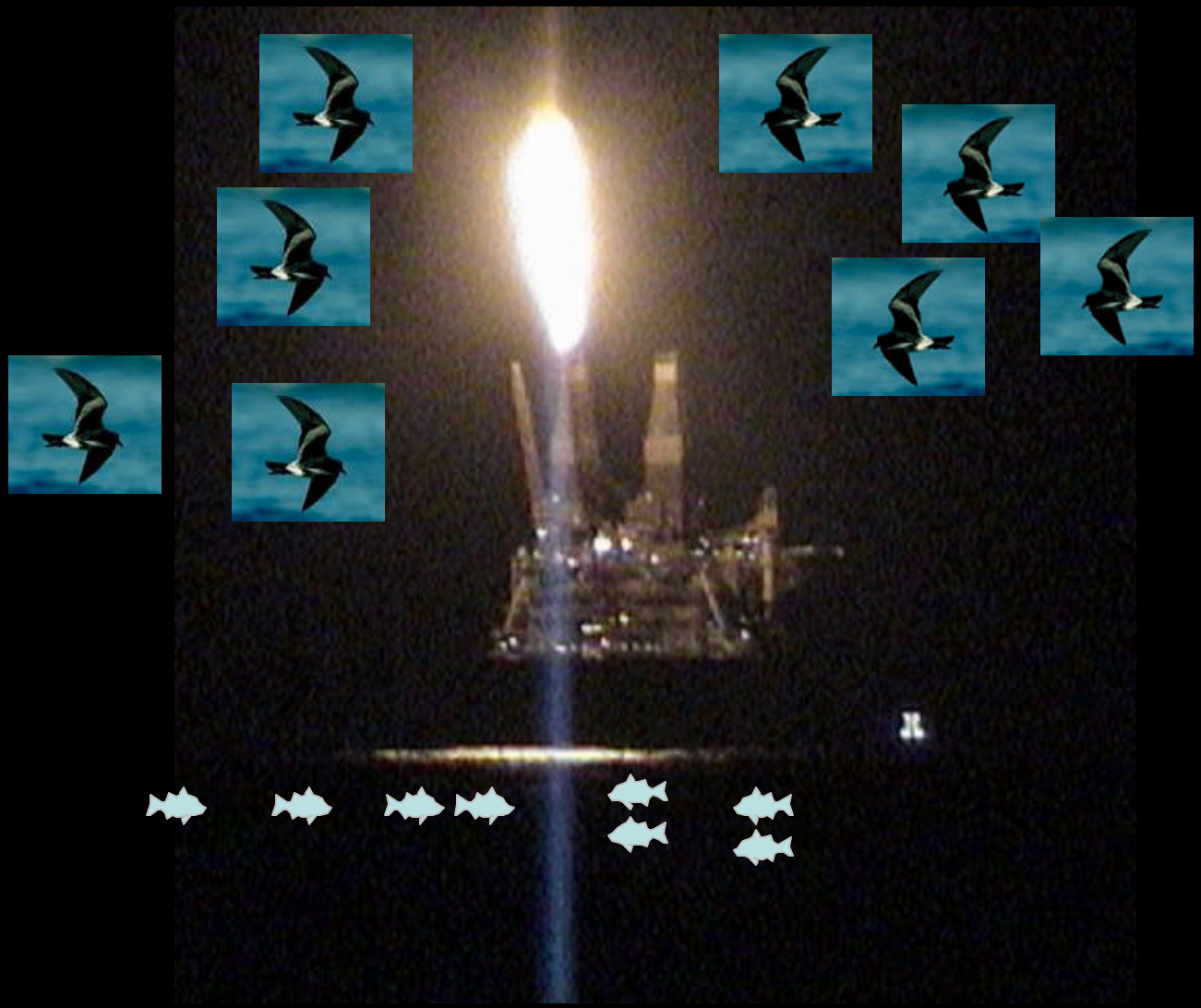
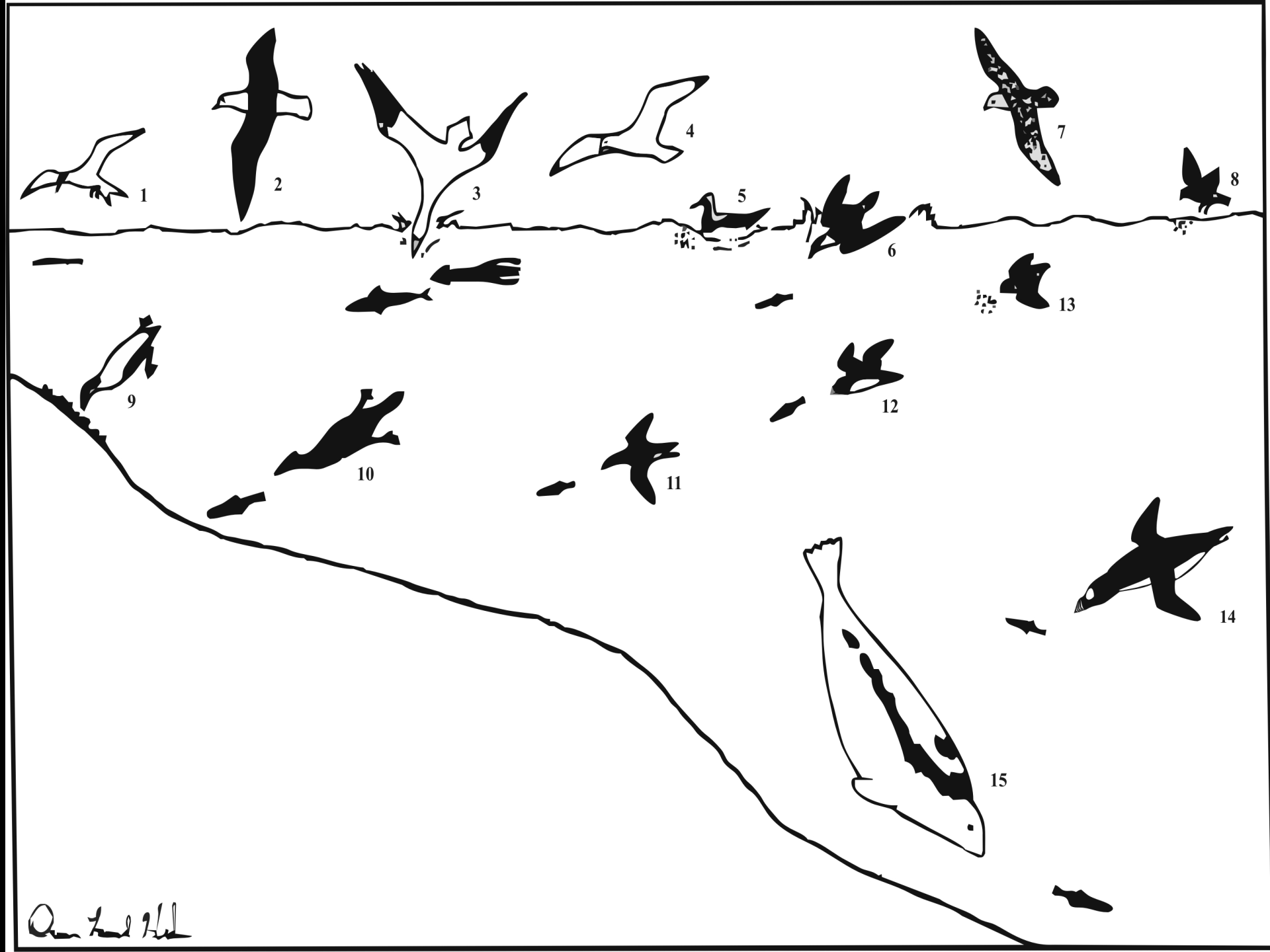
Skyward Light Attracts Birds



Light 0n Water Attracts

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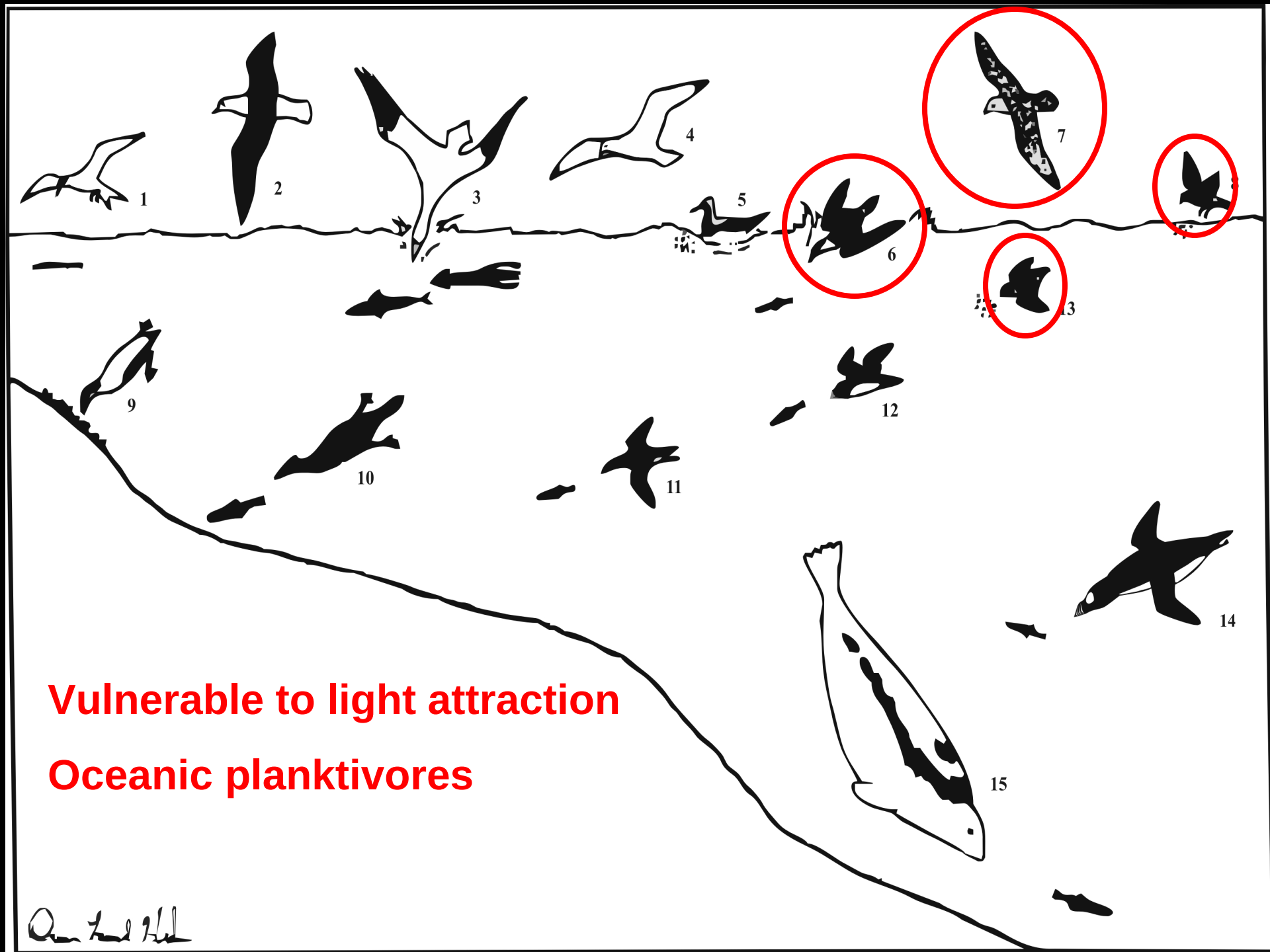
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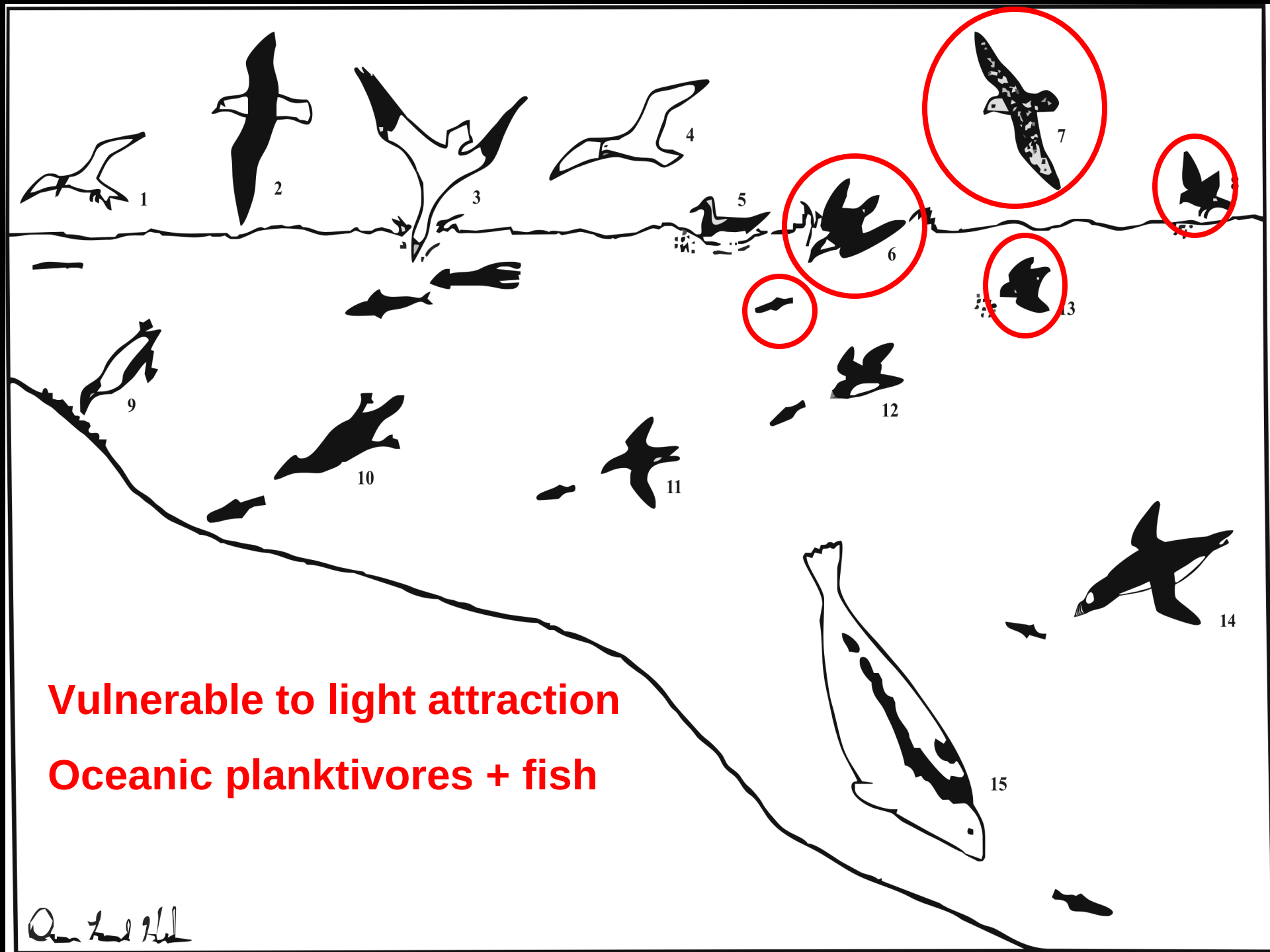
Vulnerable to light attraction
Oceanic planktivores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Vulnerable to light attraction
Oceanic planktivores + fish

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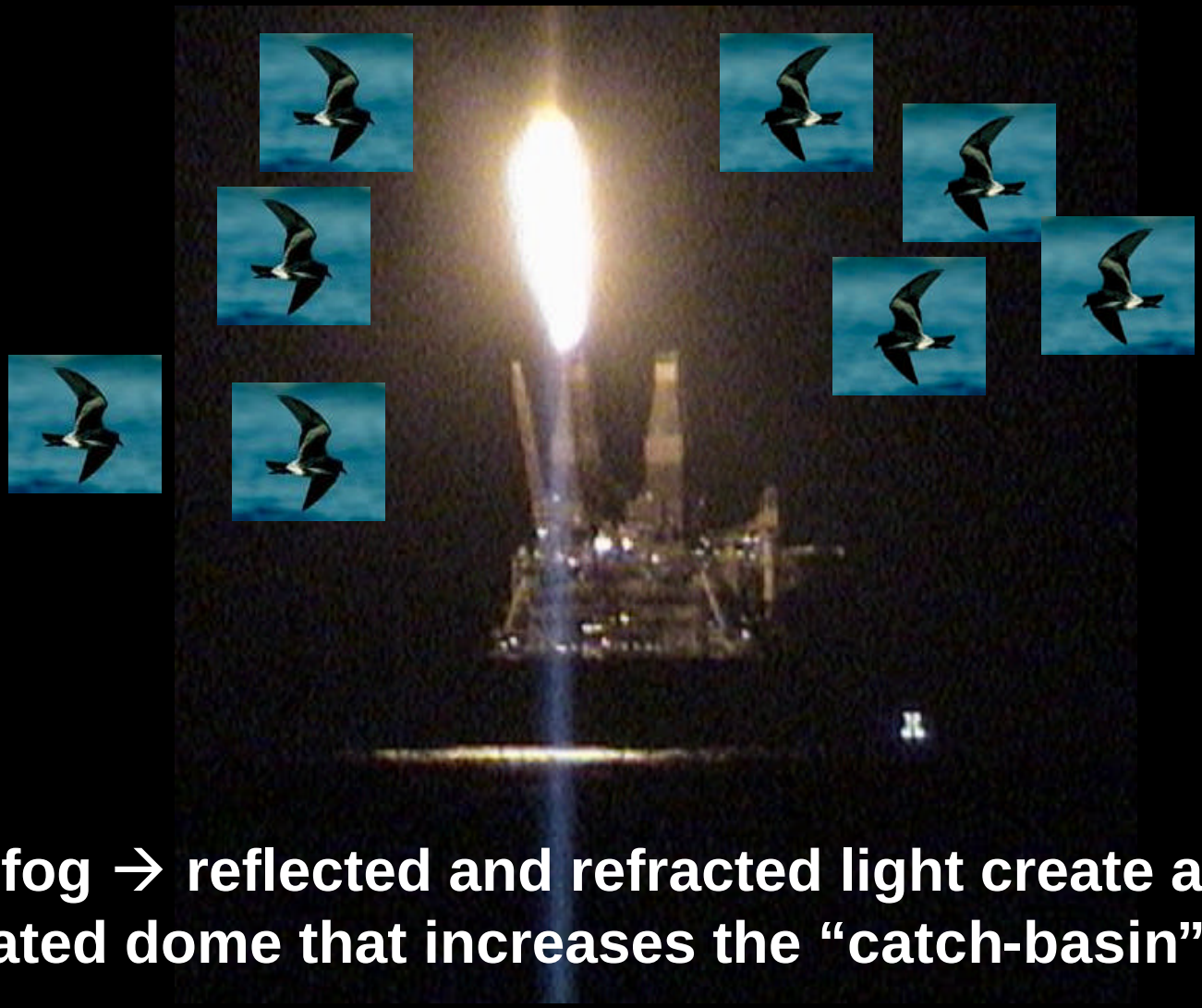
Low Cloud Cover and Fog



During fog → reflected and refracted light create an illuminated dome that increases the “catch-basin” of the light

Seasonal Whole Ocean Seabird Migration

N America

Europe

Africa

S America

Northern Migrants

- **Dovekies**
- **Thick – billed Murres**
- **Northern Fulmars**

Southern Migrants

- **Sooty Shearwaters**
- **Greater Shearwaters**

Year-round Surveys

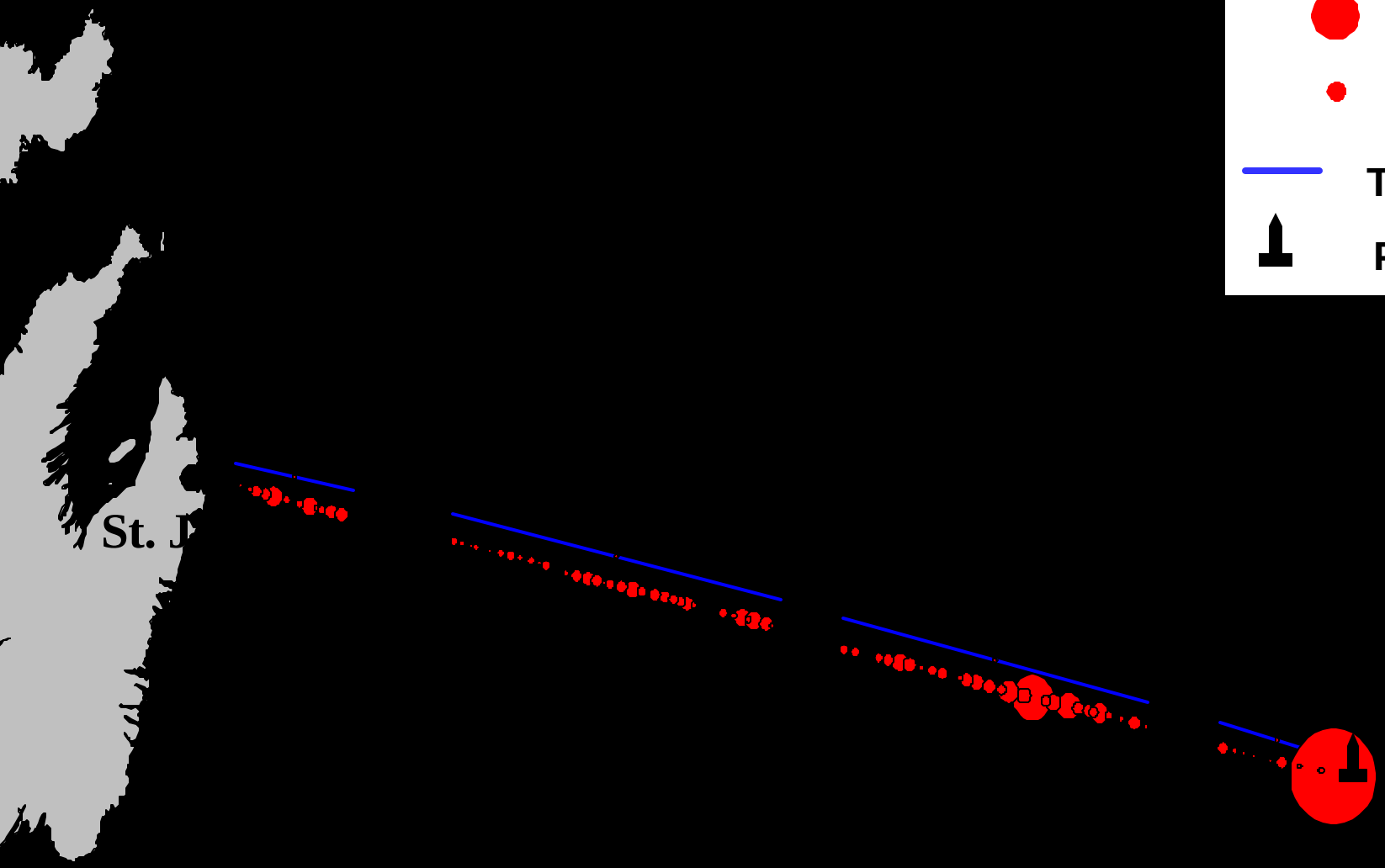
Offshore Support Vessels (1999-2003)

- conducted monthly surveys

- fixed survey line along support vessel route

- experienced and dedicated observers

Shearwaters - Spring



Seasonal Occurrences

Spring: Shearwaters

Summer: Common Murres, Whales

Fall: Storm-Petrels, Kittiwakes, Gulls

Winter: Thick-billed Murres, Dovekies

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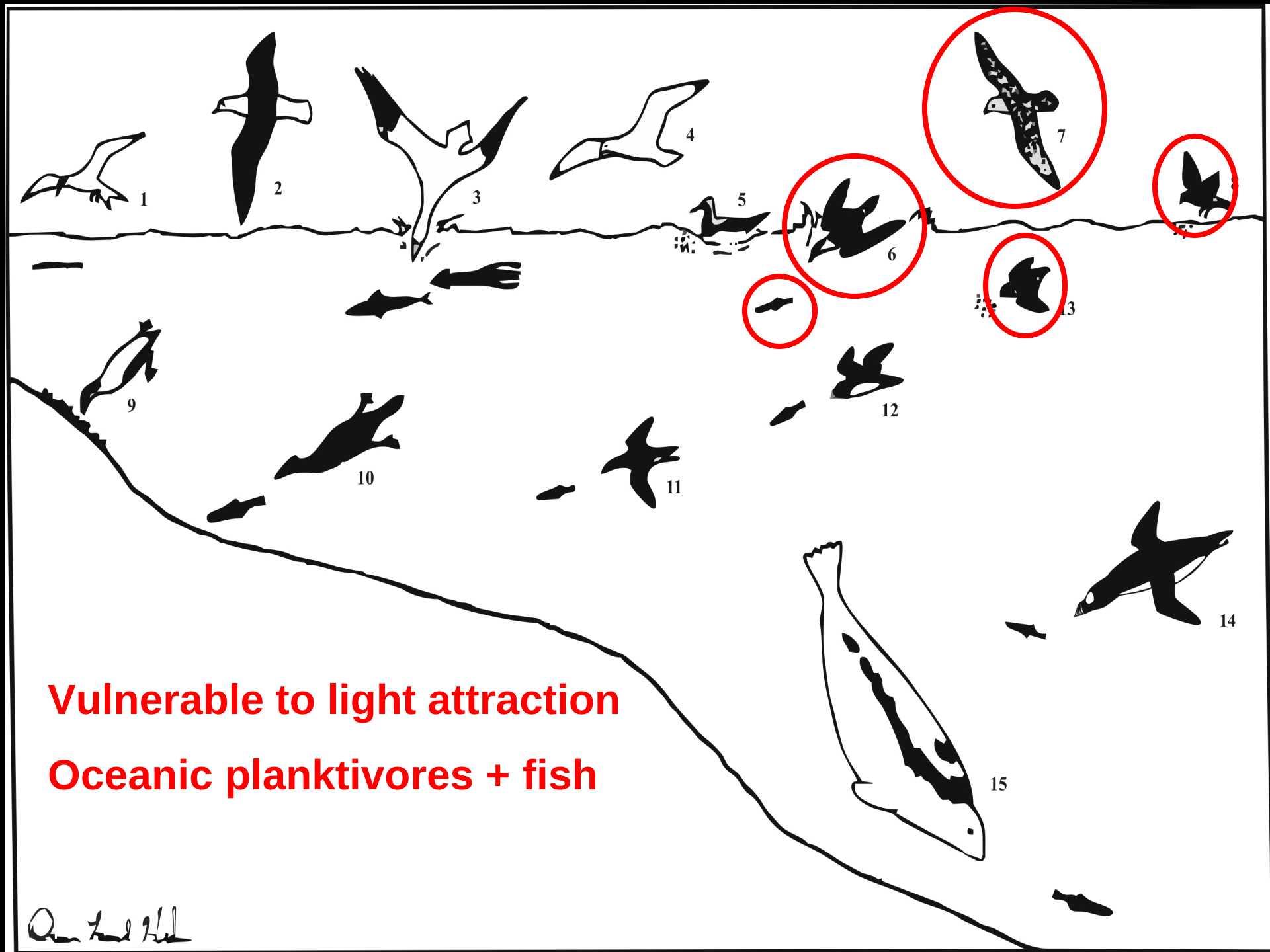
Attraction to Offshore Platforms

- **Artificial reefs**
  → **algae growth**
  → **Increase prey concentrations**

- **Light**
  - attracts fish
  - nocturnal feeding by birds

- **Roosting refuge**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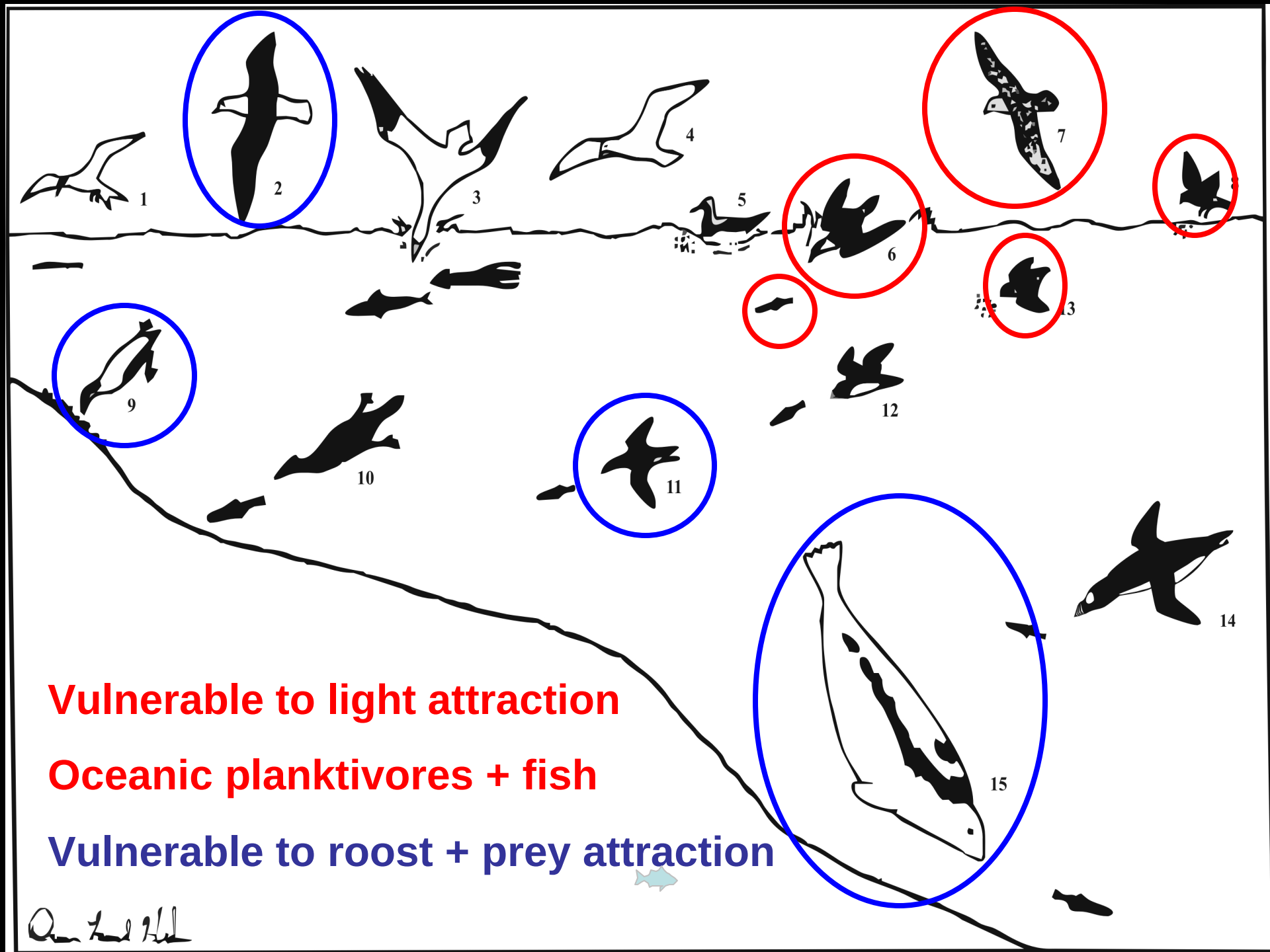
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Vulnerable to light attraction
Oceanic planktivores + fish
Vulnerable to roost + prey attraction

Gulls on Hibernia Platform - Autumn

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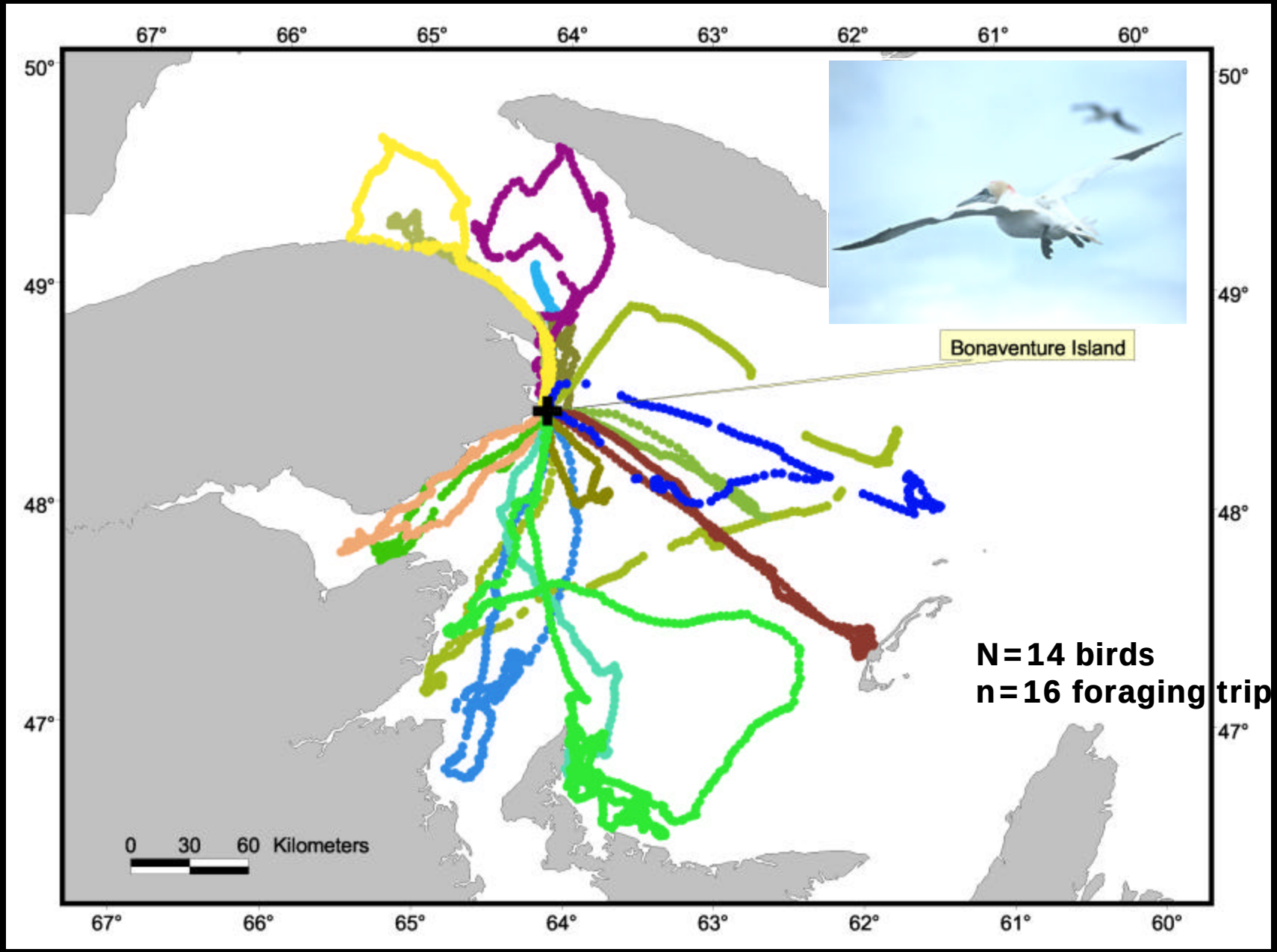
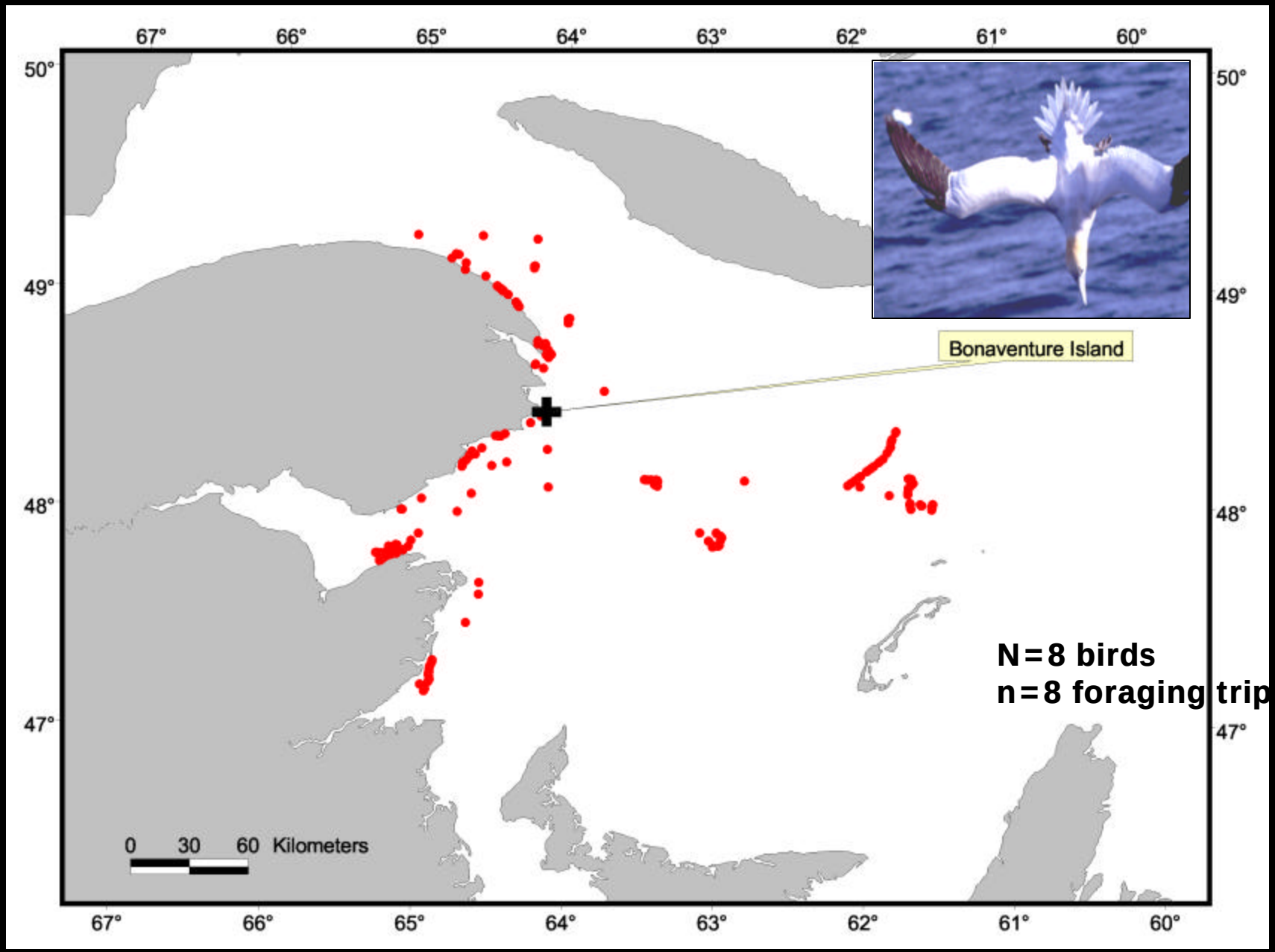
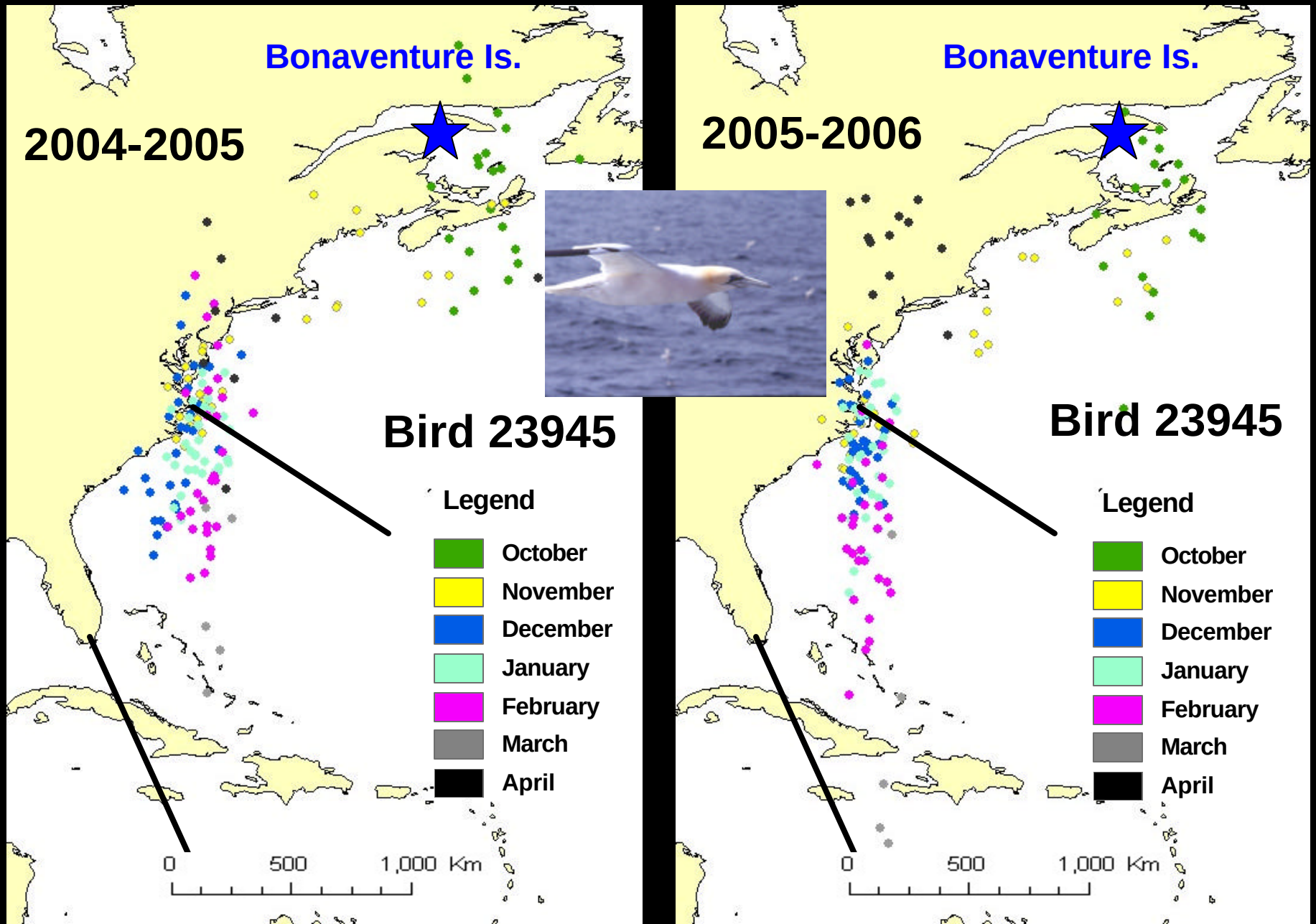
Foraging from Bonaventure I Gulf of St. Lawrence



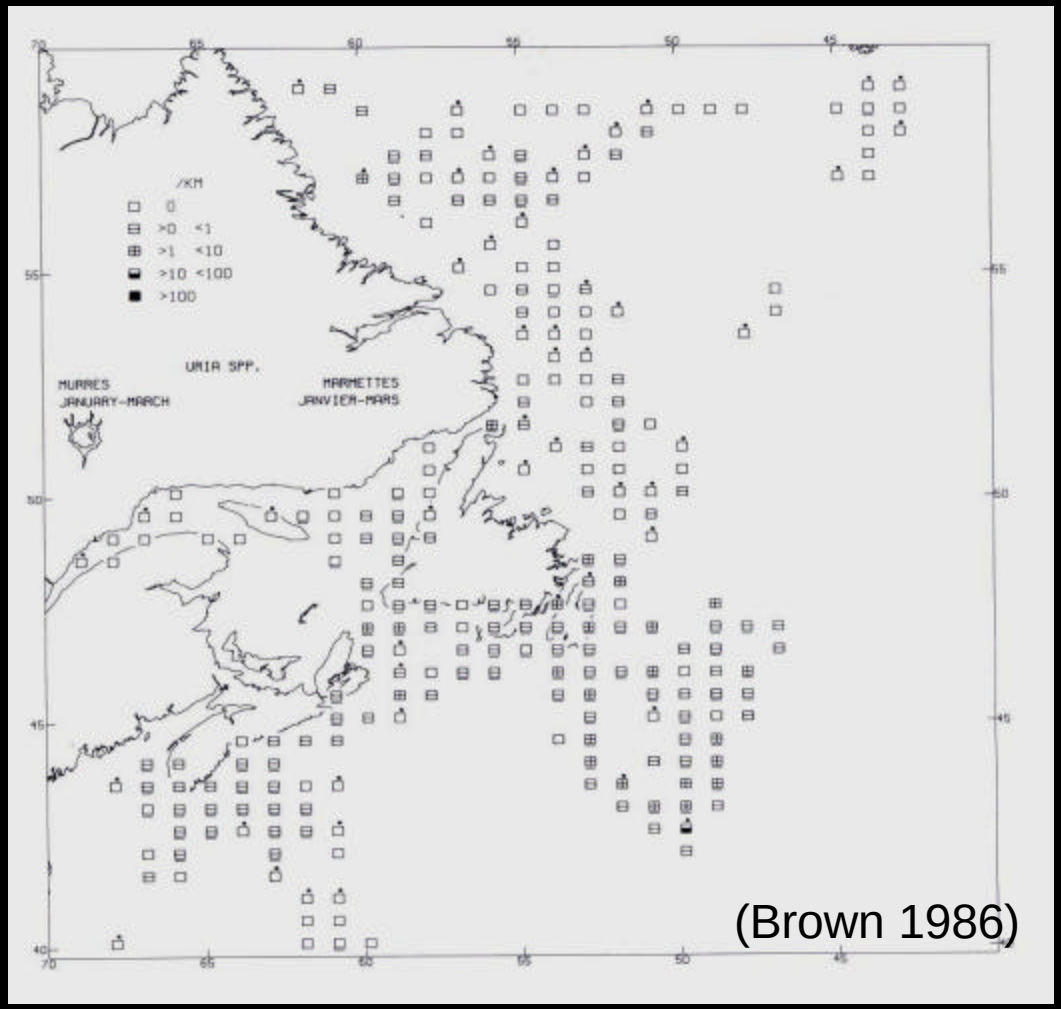
Hotspots – Dives from Bonaventure I



Consistent Use of Winter Sites - Geologgers



Murres at Sea in Winter – Ship Surveys



(Brown 1986)

Common Murre
1st Geo-location Logger

Legend

'Sheet 1$' Events

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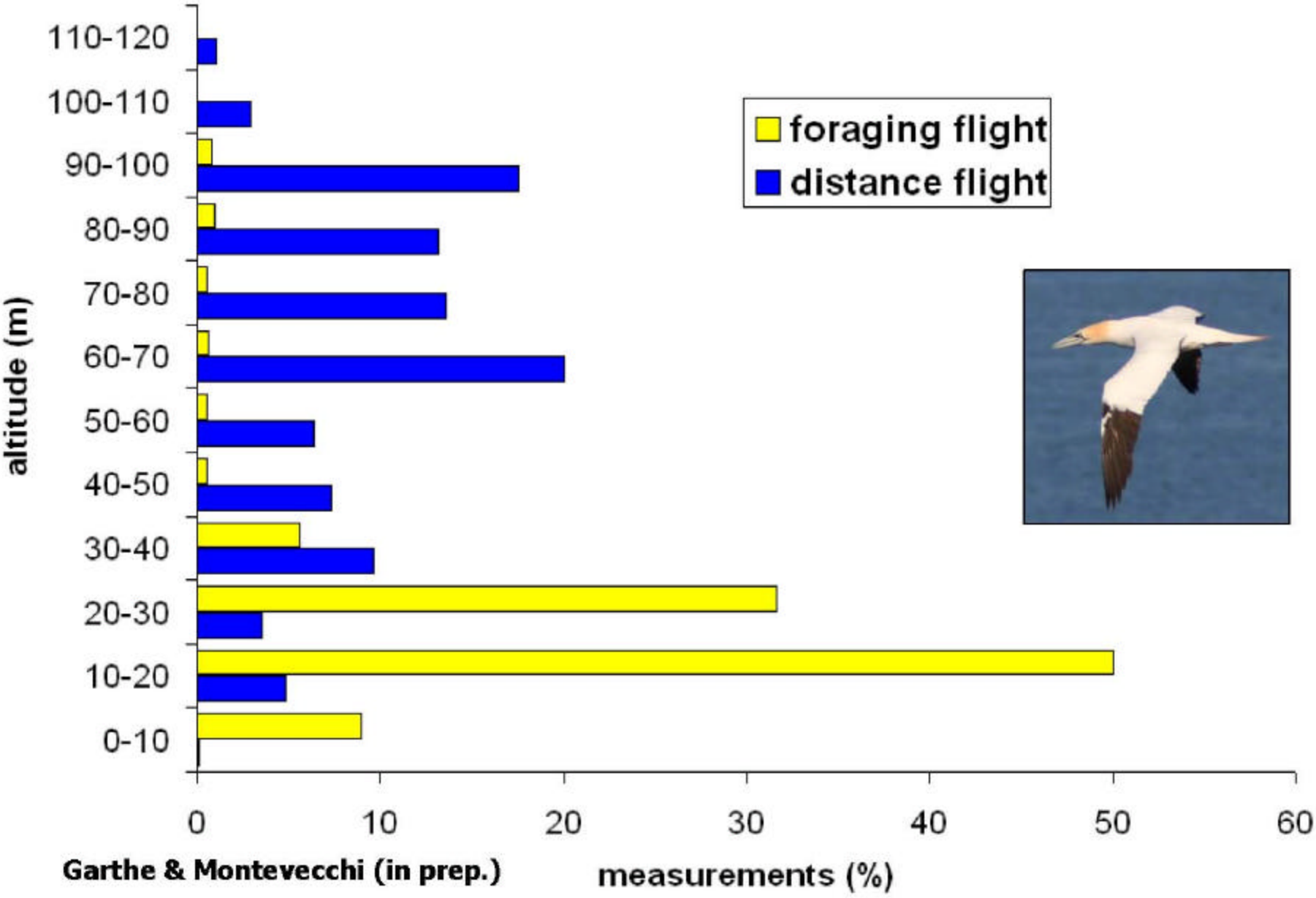
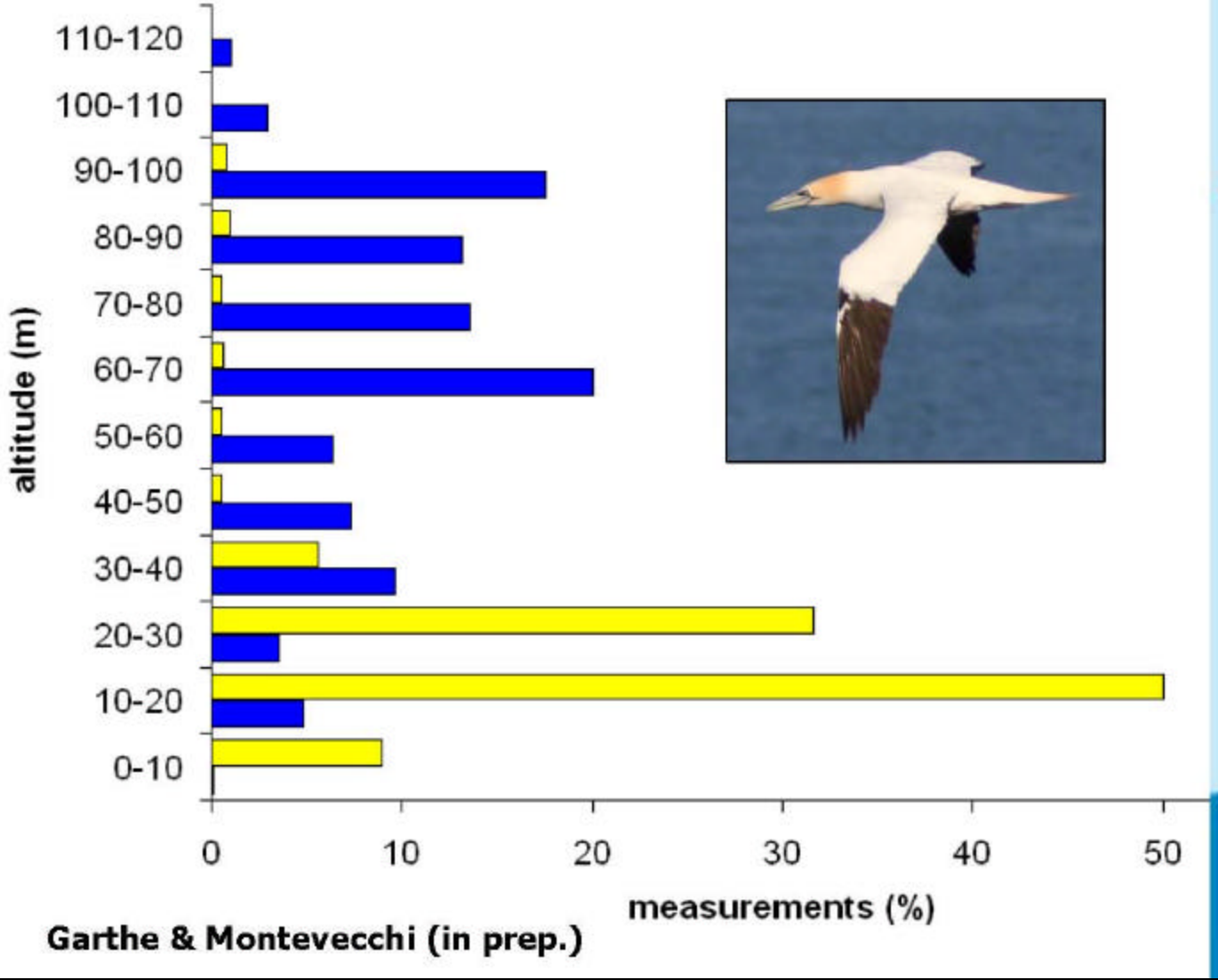
Northern Gannet flight heights (Gulf of St. Lawrence)



Northern Gannet flight heights in relation to wind farms



Garthe & Montevecchi (in prep.)

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Reports of Avian Mortality

- Average daily mortality = 0.3 birds

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- Median daily mortality = 0 birds
- Modal daily mortality = 0 birds
- Annual mortality = 110 birds

Capturing Episodic Events

- Front-end powerful year-round monitoring programs
- 24 hour coverage
- Seasonal migratory patterns
- Weather influences of fog and low cloud cover
- Independent regulatory agency observers on vessels and platforms

Episodic Events

- How to plan for uncertainty?
- How to deal with the unexpected?
- Important (essential) not be overcome by uncertainty

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Risk Assessment for Episodic Events

- **Proactive → Prevention**
- **Effective monitoring designs**

Assess spatial and temporal distributions and dynamics

Mitigation Actions and Tests

Intermittent light less attractive than steady light

Red light less attractive than white light

Mitigation

→ Document occurrences

→ Document mortality

→ Design adaptive mitigative plans and strategies

- Tends to be reactive
- Need proactive planning
- MMs workshop opportunity

- **Site selection**

- **Site selection → Site identification**

Thank you

Questions?